(12) UK Patent Application (19) GB (11) 2 124 333 A

(21) Application No 8314910
(22) Date of filing 31 May 1983
(30) Priority data
(31) 22126
(32) 9 Jun 1982
(33) Italy (IT)
(43) Application published 15 Feb 1984
(51) INT CL³ F16C 13/00
(52) Domestic classification F2U 21B 21X 22B U1S 1699 1897 1974 F2U
(56) Documents cited None
(58) Field of search F2U
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(54) Roller for supporting and feeding ceramic articles

(57) A roller is disclosed for feeding ceramic articles through processing cycles which involve a heat treatment thereof, such as baking of the ceramic articles. Said roller comprises a substantially cylindrical base body 1 of refractory material and inserts 2. The inserts are evenly distributed on the external surface of the roller and project from said surface to define a contacting surface for said ceramic articles. To prevent tile material from remaining adhered to the inserts, the latter are made of a metal such as a Ni-Cr alloy or a ceramic material which is treated to have "non-stick" properties and/or has different thermal expansion from the tile material. Inserts of other than cylindrical shape are described.

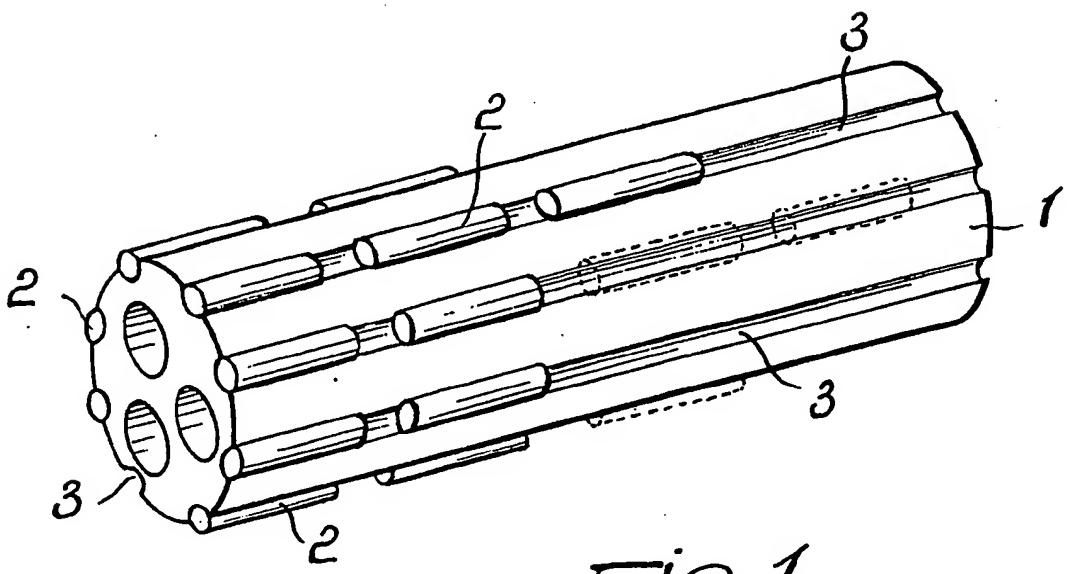

Fig. 1

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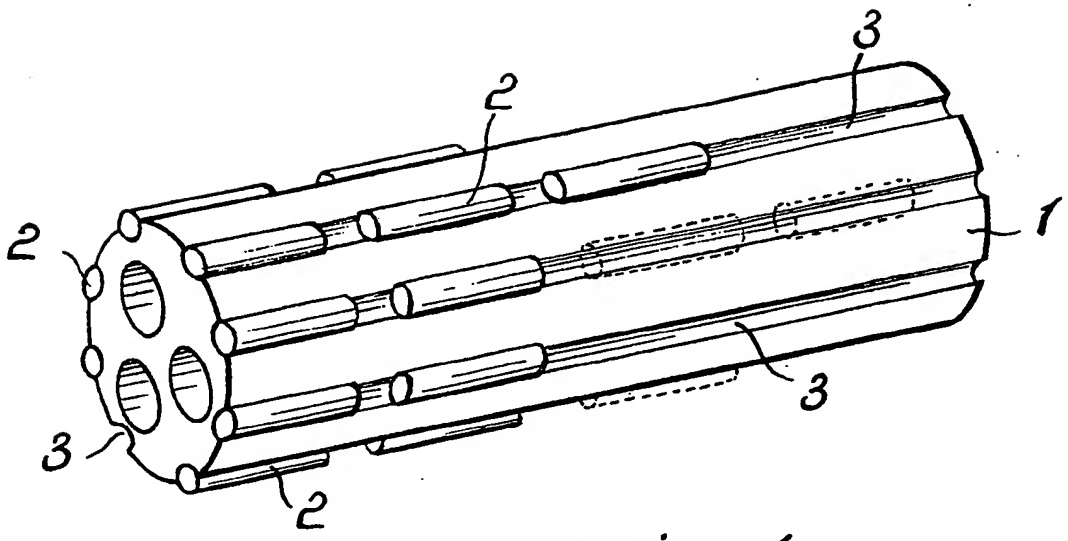

Fig. 1

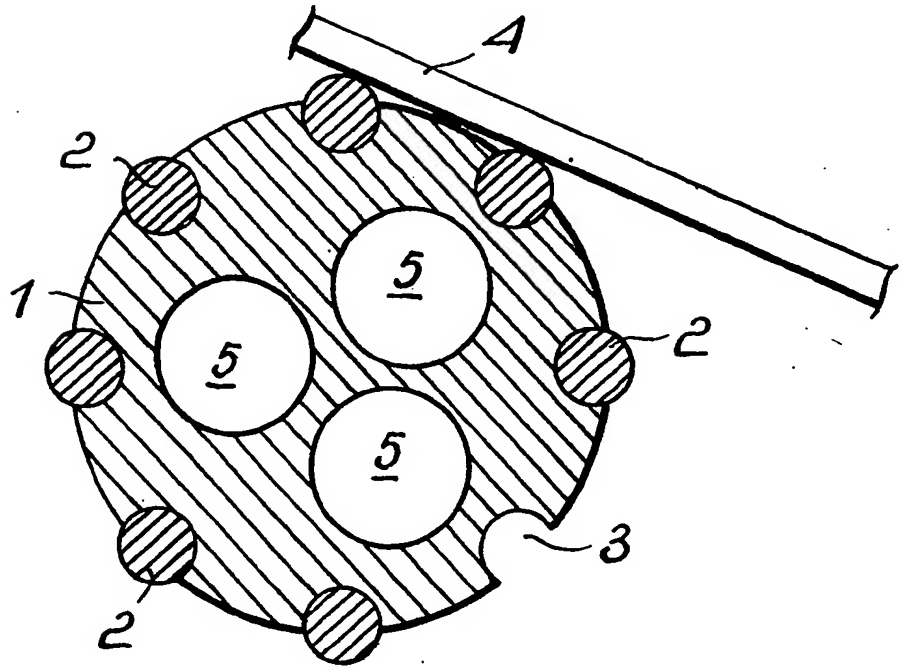

Fig. 2

SPECIFICATION

Roller for supporting and feeding ceramic articles

This invention relates to rollers for supporting and feeding ceramic articles through processing cycles which involve a heat treatment, such as baking, of the ceramic articles.

The furnaces currently used in the ceramic article industry are equipped with a plurality of rotating rollers arranged across each channel in the furnace and being evenly spaced apart longitudinally to support anf feed ceramic articles — hereinafter called tiles for brevity — forward for treatment in the furnace. The tiles are laid directly onto the rotating rollers, without using holder trays, since this affords, on account of the rotational movement of the rollers, the possibility of straightening up every few seconds the tiles in their plastic state, which are caused to travel onto the rollers, and accordingly, the obtainment of tiles directly straight and flat at the furnace outlet end.

Such rollers are fabricated from different materials, depending on the temperature whereat the furnace in which they are to be mounted is operated. If the furnace is operated at relatively low temperatures, then the supporting and feeding rollers being used will be conventionally formed from stainless steel, whereas at high and very high temperatures (e.g. of approximately 1250°C) the rollers will be formed from a ceramic material.

During the heat treatment or baking process, the tiles laid onto and being caused to advance by the rollers are in a plastic state, thereby they unavoidably leave small amounts of the ceramic material, i.e. the tile material, stuck onto the rollers. Of course, the rollers have to be cleaned at frequent intervals, to remove the material stuck thereon, in order to prevent damaging the successive tiles to be treated in the furnace.

In the instance of metal-construction rollers, such as stainless steel rollers, the problem of cleaning the rollers after the treatment is solved in a relatively easy way. In fact, since the thermal expansion coefficients of the roller material and ceramic tile material are quite different, the roller and the ceramic material left on the roller from the adhered tile expand at different rates, and thus at low temperature they shrink at different extents and this causes the ceramic material left on the roller to readily separate from the roller, which is thus made "self-cleaning".

The ceramic roller conventionally employed with high temperature heat treatments, at which temperature stainless steel would be no longer usable, is not "self-cleaning", instead, because it is made of a material closely similar to that of the tile being treated. Thus, the ceramic roller must be cleaned frequently, or even frequently replaced, which involves a cost increase and brings about processing problems.

The shortcoming mentioned above represents a serious problem for the tile manufacturer, and the more so since the demand for high temperature tiles is growing constantly, so that the ceramic rollers suitable for high temperature processing are meeting with increasing popularity.

A roller made of a special metal suitable for application with high and very high temperatures, as required with high temperature tile processing, would have the advantage of being "self-cleaning", but the utilization of such a roller would make the tile extremely expensive owing to the practically prohibitive cost of such a metal.

It is a primary object of this invention to obviate such prior difficulties by providing a roller for supporting and feeding ceramic articles through baking furnaces, which roller is high temperature-resistant, has a high mechanical strength, and facilitates cleaning from any ceramic materials stuck on its surface in the course of the heat treatment of the ceramic articles. In other words this invention is directed to provide a "self-cleaning" roller for use at high temperature.

A further object of this invention is to provide a "self-cleaning" roller which may be used for supporting and feeding ceramic articles during their treatment in baking furnaces of very simple structure and of low cost. These and other purposes are achieved by the roller for supporting and feeding ceramic articles through processing cycles which involve heat treating thereof, characterized in that it comprises a substantially cylindrical base body of a refractory material having at its external surface inserts of either metal or a special ceramic material which are evenly distributed over said surface and project therefrom to define a contacting and bearing surface for said ceramic articles.

Advantageously, the inserts are placed in receptacles formed in the surface of the roller base body.

Further features and advantages will be more readily apparent from the following detailed description of a roller according to this invention, as illustrated by way of example in the accompanying drawings, where:

Figure 1 is a perspective view of the roller according to this invention; and

Figure 2 is a cross-sectional view of the roller of Figure 1, to an enlarged scale.

Making now reference to the drawing figures, the roller for supporting and feeding ceramic materials, such as tiles, during the heat treatment thereof, according to this invention, comprises a base body 1 made of a substantially cylindrical refractory ceramic material, and a plurality of inserts 2 evenly distributed over the external surface of the base body 1.

To lower the overall weight of the roller and reduce costs as well, the base body may have an axially extending lightening bore 5. Shown in Figures 1 and 2 are three circular cross-section lightening bores, although the bores may have any suitable cross-sectional configuration and their number changed at will to meet individual requirements.

The inserts 2 are located in specially provided receptacles 3, extending longitudinally and being

formed in the surface of the base body 1 of the roller to project out of the surface of the base body 1, such as to define a contacting and bearing surface for the tiles 4 being treated.

The inserts 2 are inserted into the receptacles 3 in any suitable way, preferably in interlocking relationship. In fact, an interlocking insertion would facilitate the roller assembling as well as allow quick replacement of the interlocking members, where necessary.

The inserts 2 may have any suitable shapes, e.g. be in the forms of rod wire, foil, and sectional members configured as an L, ⊥, △, 8, or even of small balls, and in general, have any suitable shape fitting in the receptacles 3 of the base body 1.

Preferably, and as shown in Figure 1, each receptacle has fitted therein a plurality of segments such as those mentioned above with sufficient clearance therebetween to accommodate the independent expansion of each particular insert segment.

The roller base body, as mentioned, is formed from any refractory ceramic material, as is conventional in the industry, namely from a material containing alumina and clay in any suitable proportions, said material being required to have the required high mechanical strength for the particular roller application contemplated.

The inserts 2 should be made of such a material as to prevent the tile ceramic material for adhering or remaining stuck on the insert, or made of a "self-cleaning" material, that is a material having different thermal expansion and contraction properties from the material of the tiles. Further, said insert material should be capable of withstanding the high firing temperatures provided for so-called "high temperature" tiles, and in particular, of resisting high temperature oxidation because the furnace environment is a highly oxidizing one.

Thus, the inserts should be made of a metal or alloy which can successfully resist oxidation at high temperatures, the metal or alloy having different thermal expansion and contraction properties from the tile ceramic material. Particularly suitable metals or special alloys are Ni-Cr and Kantal alloys.

The inserts may also be made of special ceramic materials having a very high percentage of alumina, or of porcelain, which materials either have been subjected to some special treatments to make them "non-sticking" as regards the tile material (i.e. such that the tile material will not stick on the inserts), or have different thermal expansion and contraction properties from the material of the tiles, or have both such characteristics.

It will be apparent how the roller of this invention may also be used at a low temperature. In this case, however, for purely economical reasons, it would be convenient to replace the metal and special alloy inserts with inserts of stainless steel, which is less expensive.

It should be appreciated from the foregoing description that the roller of this invention jointly affords, also and especially at a high temperature level, all the advantages of a ceramic roller, that is a high mechanical strength and the advantages of a metal roller, that is the "self-cleaning" properties of the metal.

The refractory roller with high strength inserts according to this invention is also advantageous from the economical standpoint, since its cost does not exceed that of a conventional stainless steel roller, and is not significantly higher than that of a ceramic roller, which would, however, have to be replaced at frequent intervals, and is much smaller than the cost of a metal roller made of a special alloy to achieve all the advantages of the roller of this invention.

CLAIMS

1. A roller for supporting and feeding ceramic articles through processing cycles which involve a heat treatment thereof, characterized in that it comprises a base body of a substantially cylindrical refractory material having, evenly distributed over the external surface thereof inserts projecting from said surface to define a contacting and bearing surface for said ceramic articles of manufacture.

2. A roller according to Claim 1, wherein said inserts are selected from wire, rodball, foil, and various cross-section sectional members.

3. A roller according to Claim 1, wherein said inserts are located in axially extending receptacles formed on the surface of said base body.

4. A roller according to Claim 3, wherein said inserts are inserted into said receptacles in interlocking relationship therewith.

5. A roller according to Claim 3, or according to Claim 4, wherein said inserts comprise, in each of said receptacles, a plurality of segments having a clearance left between one another.

6. A roller according to any of the preceding claims, wherein said inserts are made of a metal or special alloy which is highly resistant to high temperatures, or alternatively of a special ceramic.

7. A roller according to Claim 6, wherein said inserts are made of a metal material selected from Ni-Cr and Kantal alloys.

8. A roller according to Claim 6, wherein said inserts are made of a ceramic material including a very high percentage of alumina, or alternatively of porcelain.

9. A roller according to any of Claims 1 to 5, wherein said metal inserts are made of stainless steel.

10. A roller according to any of the preceding

claims, wherein said base body has at least one axially extending lightening bore therethrough.

11. A roller for supporting and feeding ceramic articles of manufacture through processing cycles which involve a heat treatment thereof, substantially as herein described and illustrated.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1984. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

Nr. 671.076

Ministry of Economic Affairs

PATENT

The Ministry of Economic Affairs
According to the law of 24 May 1854 regarding Patents;
According to the Convention on the Protection of the Industrial Property;
According to the Minutes of 19 October 1965 at 2:10 PM of the Industrial Property Service;

DECIDES:

Article 1. *To issue* to the MECHANICAL SHOPS OF DOUAISIS Public Company,
6 Boulevard Louis Breguet, Douai (North) France,
Represented by Mrs J and Mr Bede in Brussels,

a patent for: Roller for conveyor belt,

which they declare to have been the subject of a request for patent submitted in France on 26 October 1964

Article 2. – *This patent is issued without any prior examination, at their own risk, without guarantees to the reality, the novelty or the value of the invention, or the accuracy of the description, and without any prejudice to the rights of other parties.*

To this decision one should attach copies of the Patent Specifications (description and designs/draft/drawing if any) signed by the interested party and submitted in support of the patent request.

Brussels, 12 November 1965
General Director

J.Hamels

Roller for conveyor belt
Public Company: MECHANICAL SHOPS OF DOUAISIS
Request for French Patent PV.992.678 submitted on 26 October 1964.

The roller is one of the essential elements of a conveyor belt; the rollers are the ones who actually support the conveyor belt on its entire length. They generally consist of a steel tube turning on an axle with margins fixed on supports. The rollers are placed at regular intervals established according to the importance of the load they are going to support, usually at 1 to 1.5 meters for the upper rollers supporting the loaded side of the belt.

For the latter one must take special precautions in the area where the transporters are loaded in order to avoid damages to the belt due to the impact of the products being loaded, or damages to the products themselves. To avoid such accidents, (next page)

it is useful to place shock absorbers in the area where the products are landing, to give support to the belt. In most cases, the roller itself acts as shock absorber.

In general the rollers used for this are made up by stacking on the steel tube toric rubber washers, one next to each other, with interposition of washers made of tougher materials, for example steel or wood.

There are a few inconveniences to using such rollers, for example:

- There is a [illegible] between bores of the washers and the supporting steel tube; this causes the washers to rotate as the belt rotates without engaging a rotation of the steel tube itself. This leads to the rapid deterioration of the washers.
- When the products fall on the transporter, the washers spread and parts of the products being transported get stuck in the interstices (openings) of the washers, causing their premature deterioration.

The current invention consists of a shock absorbing roller to eliminate all these inconveniences.

The shock absorbing roller fashioned in the current invention is characterized by an original rubber casing, with or without pockets, with bores having one or more grooves to accommodate cotter pins, the outside of the steel tube having cotter pins made of flatiron corresponding to the size of the rubber casing grooves. The engaging (*see next page*)

of the casing and the steel tube is accomplished in a positive way, through the flatiron of the cotter pins.

The attached drafts are examples of the way this invention was accomplished.

Drawing nr 1 is a longitudinal sectional view.

Drawing nr 2 is a transverse sectional view following the II-II line of drawing nr 1.

Drawing nr 3 is an analog view of one of the versions.

The shock absorbing roller presented has an axle 1, with an appropriately mounted ferrule 2, with two flatiron bars welded to the exterior 3 and 4, diametrically opposed.

The shock absorbing element consists of the rubber casing 5, with two grooves for cotter pins 6 and 7 corresponding in size with the flatirons 3 and 4.

This way the engaging between the casing and the steel tube is accomplished in a positive way, through the flatiron of the cotter pins.

The end plates 8 and 9, inserted in the ferrule and welded at the ends, prevent any longitudinal movement of the rubber casing 5; Transversal circular grooves 10 are placed on the exterior sides.

The outside of the rubber casing can be smooth or can have different patterns or non circular grooves, for example longitudinal or slanted, in order to increase the flexion of the rubber. *(see next page)*

In addition to the grooves for cotter pins 6 and 7, the rubber casing 5 may have, as illustrated in drawing nr 3, pockets 11 meant to increase the elasticity.

Obviously, the description of the way the invention was perfected and the attached drafts are exclusively general and non-limiting and many modifications can be brought to it, without diverging from the title of this current invention.

CLAIMS

1. A roller for conveyor belt is an assembly of a unique rubber casing 5 with bores having one or several grooves for cotter pins 7, the outside of the steel tube having cotter pins 4 made of flatiron corresponding to the size of the rubber casing grooves.
2. A roller as described under claim number 1 has as characteristics a rubber casing 5 with pockets 11 to increase elasticity.

Brussels

"I, Silvia Antonescu, to the best of my knowledge, certify that this is a true and accurate translation of the document "Brevet d'invention - Patent "

Signature: SAntonescu

Date: 09/30/09